UEECD0046 – Assessment 2 of 3 – Knowledge

Unit Code and Name

UEECD0046 - Solve problems in single path circuits

Course Code and Name

UEE30820 – Certificate III in Electrotechnology Electrician UEE33020 – Certificate III in Electrical Fitting

Student Details

Student Full Name:	
Student Number:	
Location and Class:	
Teacher/Assessor:	
Date of Assessment:	

Assessment Result

Section	Marks Available	Marks Achieved	Cutting Score	Assessment Result
All questions	88		61	☐ Satisfactory ☐ Unsatisfactory

Assessor Feedback

Assessor Signature:		**Date:**	
Assessor Comments:			

Was reasonable adjustment in place for this assessment event? ☐ No ☐ Yes

If yes, ensure it is detailed on the Assessment Instructions page.

Assessment Instructions

Assessment Details	Instructions
Assessment Overview	This assessment is designed to assess the student's knowledge associated with the unit. Full details can be found in the *Unit Assessment Guide*. This assessment includes a range of question types. Instructions on how to answer each question is provided at the beginning of the questions. An *Equation Reference Sheet* is provided on the last page of the assessment. **Mobile phones and other recording devices must not be accessed during the assessment**.
Satisfactory Result	To obtain a result of "Satisfactory" the student must score 70% or higher. The cutting score to achieve 70% is shown on the front page.
Submission Instructions	On completion of the assessment the student must sign the *Student Declaration* on the last page and then hand the assessment to the teacher/assessor for marking.
What does the student need to provide?	Pens (red, black, blue, green), pencils, eraser, rule, highlighter. Non-programmable calculator.
Time Allowed	The time allowed for this assessment is **60 minutes**.
Reasonable Adjustment (if applicable)	
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Instructions for answering questions

Multiple choice questions... Circle the letter of your choice. (b)
If you change your mind, mark the item with a cross (⊗) and make another choice.

Multiple response questions... Circle ALL of the letters to indicate your choices. (a) b (c) d
To change a response, mark the item with a cross and chose again. (a) b (⊗) (d)
If you select more than the maximum specified you will score zero for the question.

Written response questions... Write your answer in the space provided – e.g. 230 V

Calculation questions... Show all working and write your answers in the spaces provided. Answers should be in engineering notation rounded to three significant figures.
For example: 267.3 volts rounds to 267 volts
1.246 amps rounds to 1.25 amps

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1. Indicate which of the following scenarios are examples of **static** electricity or **dynamic** electricity?

   Each correct response scores one mark.

   Options: A - Static electricity
   B - Dynamic (current) electricity

Scenario	Option
A lightning strike between a storm cloud and the ground.	
The electricity that flows from a battery to the lamp in a torch.	
The 'zap' you sometimes feel from a car door when you open it.	
The electricity supplied to your house from the street mains.	

/ 4

2. The table below lists examples of electricity production using different sources of energy. Indicate for each process whether the energy source is **renewable** or **non-renewable** by placing a "X" in the relevant box.

   Each correct response scores one mark.

Electricity Production Process	Renewable	Non-Renewable
Coal fired boiler that converts water to steam which spins a turbine connected to a generator that produces electricity.		
Wind powered turbine which spins a generator via a gear box to produce electricity.		
Water from a dam is gravity fed to a turbine connected to a generator that produces electricity.		
Solar radiation falls on photovoltaic panels to produce electricity.		

/ 4

3. Transmission of electricity from a power station to the distribution network is done at very high voltages to:

a) reduce power loss

b) maintain efficiency

c) stabilize network voltages

d) reduce earth leakage currents

/ 1

4. In NSW, the distribution cables from a zone substation to the supply transformers in the street usually operate at a voltage of:

a) 230/400V

b) 11kV

c) 33kV

d) 132kV

/ 1

5. Match the loads below with the options provided to indicate how electricity is utilised in each case.

Each correct response scores one mark.

Options: A - Heat

B - Light

C - Motion

Loads	Option
Electric motor	
Electric radiator	
LED lamp	

/ 3

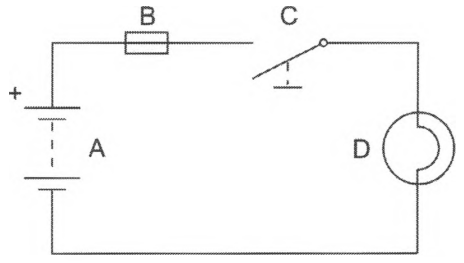
6. If an electric welding machine takes a current of 40 amperes for 15 seconds, what quantity of electricity is transported to the welder?

Q = _____

/ 1

7. Match the symbols labelled 'A' to 'D' in the circuit diagram below with their **name** and **purpose** as listed in the table.

Each correct response scores one mark.



Name and Purpose	Letter
Lamp – functions as the circuit load.	
Energy source – supplies power to the circuit.	
Switch – controls availability of power to the load.	
Fuse – protects the circuit against overcurrent.	

/ 4

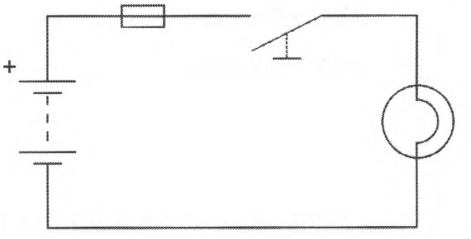
8. Closing the switch in the circuit on the right will cause:

a) applied voltage to increase

b) applied voltage to fall to zero

c) circuit current to increase

d) circuit current to fall to zero



/ 1

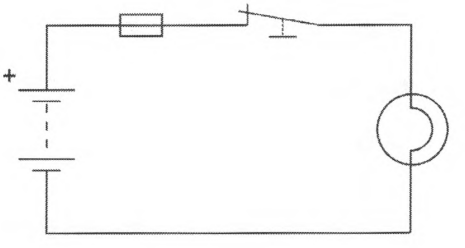
9. Opening the switch in the circuit on the right will cause:

a) applied voltage to increase

b) applied voltage to fall to zero

c) circuit current to increase

d) circuit current to fall to zero



/ 1

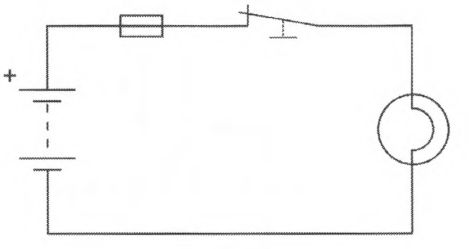
10. If the load in the circuit on the right is **short-circuited**, the circuit current will:

a) increase dramatically

b) increase slightly

c) stay the same

d) reduce slightly



/ 1

11. A value of 33,000 volts is equivalent to:

a) 0.33 kV

b) 3.3 kV

c) 33 kV

d) 330 kV

/ 1

12. A value of 0.025 amps is equivalent to:

a) 2.5 milliamps

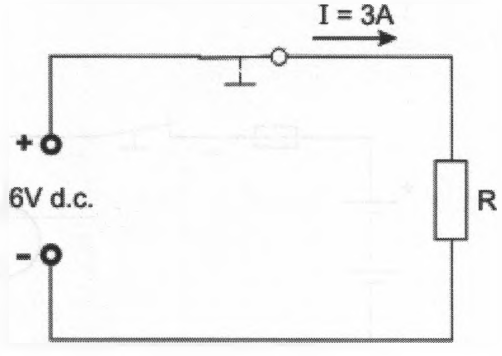
b) 25 milliamps

c) 250 milliamps

d) 2500 milliamps

/ 1

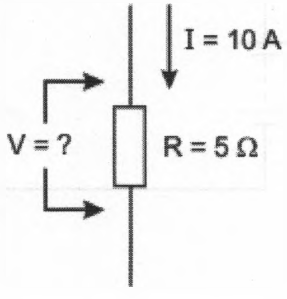
13. What is the value of the resistor in the circuit below based on the measured values of voltage and current?



R = _____

/ 1

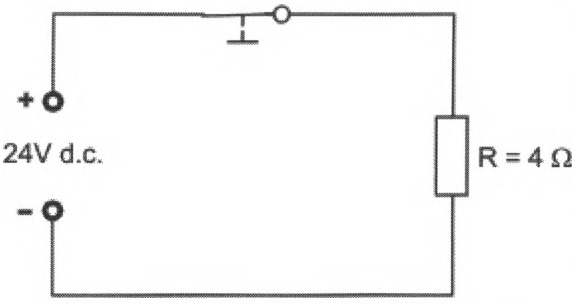
14. What is the value of the voltage in the circuit below based on the measured values of current and resistance?



V = _____

/ 1

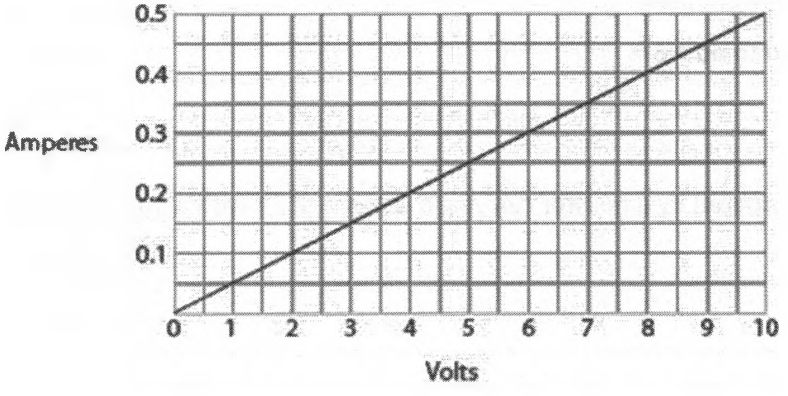
15. What is the value of current in the circuit based on the measured values of voltage and resistance?



I = _____

/ 1

16. The graph below shows the current that will flow through a resistive load when different values of voltage are applied.



Determine the current when the applied voltage is 5 volts. I = _____

/ 1

17. For any fixed resistance, an **increase** in the applied voltage will cause the circuit current to:

a) increase

b) stay the same

c) decrease

d) fall to zero

/ 1

18. For a fixed supply voltage, a **slight increase** in circuit resistance will cause the circuit current to:

a) increase

b) stay the same

c) decrease

d) fall to zero

/ 1

19. The terms '**work**' and '**energy**' are directly related to:

a) the speed of an object

b) the rate at which energy is used

c) the distance a force moves a body

d) the power required to move an object

/ 1

20. **Power** may be defined as:

a) the time spent doing work

b) the rate at which work is done

c) the total amount of work done

d) the energy required to do work

/ 1

21. Calculate the power dissipated by a resistor carrying a current of 2A with a measured voltage drop of 12V.

P = _____

/ 1

22. Calculate the power dissipated by a 68 Ω resistor when carrying a current of 150 mA.

P = _____

/ 1

23. An electric iron has a power rating of 1150W at 230V. What is the resistance of the element?

R = _____

/ 1

24. An electric oven has an element resistance of 15 Ω. What is the oven's power rating when supplied at 230V?

P = _____

/ 1

25. To determine the power consumed in a d.c. circuit you would need to multiply the readings of:

a) a voltmeter and a wattmeter

b) a voltmeter and an ammeter

c) an ammeter and a wattmeter

d) a wattmeter and an ohmmeter

/ 1

26. When using a wattmeter to measure the power consumed by a load, the current coil of the wattmeter must be connected:

a) in series with the load

b) in parallel with the load

c) across the supply voltage

d) across the resistor taking the current

/ 1

27. When using a wattmeter to measure the power consumed by a load, the potential coil of the wattmeter must be connected:

a) in series with the load

b) in parallel with the load

c) in series with a voltmeter

d) directly across the current coil

/ 1

28. A 330Ω resistor is to be connected to a 24V supply. What is the minimum power rating required for the resistor?

a) 1 watt

b) 2 watts

c) 3 watts

d) 5 watts

/ 1

29. A 12Ω resistor rated at 20W is connected directly across a 24V supply. The power dissipated will be:

a) minimal and there will be negligible heat generated

b) around half of the resistor's power rating with capacity for more current to flow

c) close to the resistor's maximum power rating but still within operational range

d) beyond the resistor's power rating and the resistor will be damaged

/ 1

30. Which of the following are all typical **physiological** effects of electric current?

a) Luminosity, burns and corrosion

b) Magnetic fields, burns and luminosity

c) Ventricular fibrillation, asphyxia and muscle spasms

d) Corrosion, ventricular fibrillation and magnetic fields

/ 1

31. Electric current in a solid conductor is a movement of electrons through the conductor. During this process, whenever electrons collide with atoms and ions in the conductor it results in:

a) heating of the conductor

b) corrosion of the conductor

c) magnetisation of the conductor

d) generation of a voltage in the conductor

/ 1

32. When an electric current flows through an LED, electrons release energy as photons which generate:

a) heat

b) light

c) sound

d) vibration

/ 1

33. Electric current flowing in a solid conductor will result in an electromagnetic field that can be used for motive power applications. If the value of current is increased, the strength of the magnetic field will:

a) increase

b) remain the same

c) reduce

d) fall to zero

/ 1

34. An electric current will produce a chemical reaction if two dissimilar metals are placed in:

a) a dielectric

b) an insulator

c) a conductor

d) an electrolyte

/ 1

35. Match the effects of electric current listed below with the typical applications listed in the table.

Each correct response scores one mark.

Effects of electric current: A - Chemical

B - Heating

C - Magnetic

D - Physiological

Application	Effect
Electric motor	
Electroplating	
Electric toaster	
Medical defibrillator	

/ 4

36. Where two dissimilar metals are in contact with one another in the presence of an electrolyte:

a) corrosion will occur

b) the metals will heat up

c) a magnetic field will be present

d) a substantial voltage will be generated

/ 1

37. Which of the following is deemed by AS/NZS 3000 to be a suitable method of protection against the damaging effects of overcurrent?

a) Use of a dry chemical fire extinguisher

b) Protecting circuits with a suitable fuse or circuit-breaker

c) Placing conductors and electrical equipment out of reach

d) Installation of barriers between equipment and personnel

/ 1

38. The power input to a motor is 10kW and the power output is 8kW. Calculate:

- the losses
- the efficiency

Each correct response scores one mark.

P_{LOSS} = _____

Efficiency % = _____

/ 2

39. A piezoelectric device produces an EMF when exposed to:

a) heat

b) light

c) sound

d) pressure

/ 1

40. An EMF is produced in a generator by:

a) a magnetic field moving through the generator windings

b) a chemical reaction occurring between the windings

c) physical pressure being applied to the windings

d) heat being pumped through the windings

/ 1

41. The photovoltaic cell produces an EMF when exposed to:

a) heat

b) light

c) sound

d) pressure

/ 1

42. An EMF is produced by a thermocouple by:

a) a magnetic field cutting through the thermocouple

b) a chemical reaction occurring inside the thermocouple

c) physical pressure being applied to the end of the thermocouple

(d) heat being applied to the end of the thermocouple

/ 1

43. Primary cells, secondary cells and fuel cells produce electric current when:

a) heat is applied to the cell plates

(b) a chemical reaction occurs inside the cell

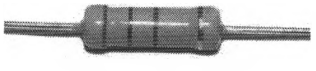
c) a magnetic field cuts through the cell plates

d) physical pressure is applied to the cell plates

/ 1

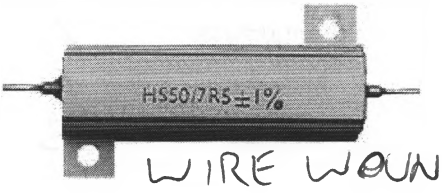
44. Identify the following fixed resistor types by writing the letter for each beside the types listed in the table below.

Each correct response scores one mark.



CARBON

Resistor A
(beige case)



WIRE WOUND

Resistor B
(gold metal case)

metal

Resistor C
(blue case)

Fixed Resistor Type	Resistor
Metal film	C
Carbon film	A
Wire wound	B

/ 3

45. The resistor type most suitable for high power applications is the:

a) metal film resistor

b) carbon film resistor

(c) wire wound resistor

/ 1

46. The resistor type most suitable for precision applications where long-term stability is required is the:

(a) metal film resistor

b) carbon film resistor

c) wire wound resistor

/ 1

47. Identify the following variable resistor types by writing the letter for each beside the types listed in the table below.

Each correct response scores one mark.

Resistor A

Poten

Resistor B

Trim Pot

Resistor C

Rheo

Variable Resistor Type	Resistor
Potentiometer	A
Rheostat	C
Trim pot	B

/ 3

48. Which of the following are often embedded in the windings of an electric motor to monitor winding temperature?

a) Varistors

(b) Thermistors

c) Potentiometers

d) Rheostats

/ 1

49. Which of the following are used in overvoltage protection devices?

(a) Varistors

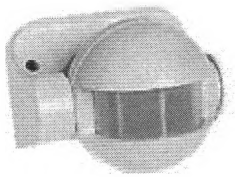
b) Thermistors

c) Potentiometers

d) Rheostats

/ 1

50. The movement sensor below is typically used to switch lights on when it gets dark. What component within the device prevents operation during the day?



a) VDR

b) LDR

c) PTC

d) NTC

/ 1

51. When the voltage applied to a *voltage dependent resistor* exceeds the **clamping** voltage, the measured resistance of the device:

a) increases

b) remains the same

c) decreases

d) falls dramatically

/ 1

52. When a *light dependent resistor* is exposed to increasing levels of light, the measured resistance of the device:

a) increases

b) remains the same

c) decreases

d) falls dramatically

/ 1

53. When a PTC thermistor is heated, the measured resistance of the device:

a) increases

b) remains the same

c) decreases

d) falls dramatically

/ 1

54. Power loss in an electrical cable is primarily due to:

a) insulation failure

b) stranding of conductors

c) excessive supply voltages

d) the resistance of the conductors

/ 1

55. A resistor is colour coded with bands **red, red, red, gold**. Determine the values specified in the table below.

Each correct response scores one mark.

Nominal Resistor Value	
Resistor Tolerance	
Upper Tolerance Limit	
Lower Tolerance Limit	

/ 4

56. Which **three (3)** of the following are examples of a **series circuit**?

Each correct response scores one mark.

a) Fuse protecting a load

b) 12v outdoor garden lighting

c) Switch controlling a single lamp

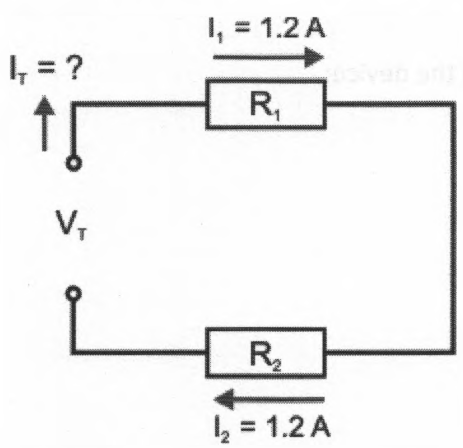
d) Circuit consisting of several socket-outlets

e) Digital voltmeter measuring the voltage across a load

f) Analogue ammeter measuring the current through a load

/ 3

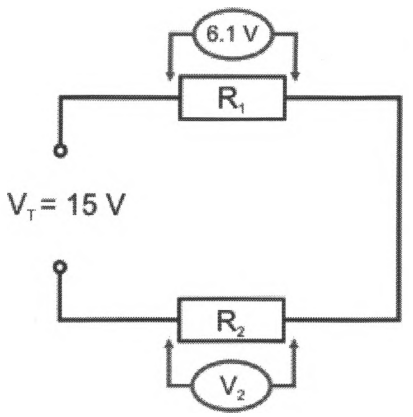
57. Determine the total current I_T flowing into the circuit below.



I_T = _____

/ 1

58. Determine the voltage drop across resistor R2 in the circuit below.



V_2 = _____

/ 1

59. Three resistors of 10 Ω, 20 Ω and 30 Ω are connected in **series** to 120V DC supply. Calculate:

- total resistance
- circuit current
- total power consumed
- voltage drop across the 20 Ω resistor

R_T = _____

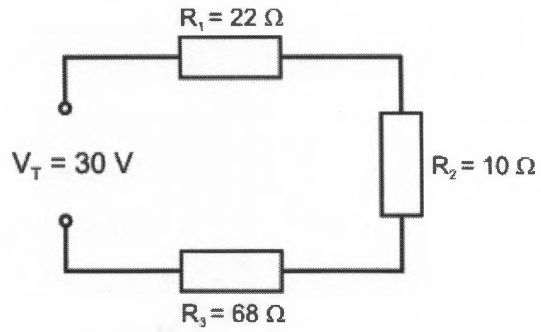
I_T = _____

P_T = _____

V_{20} = _____

/ 4

60. In a series connected circuit like the one below, if R_2 goes **open circuit**:



a) the circuit current will increase

b) the circuit current will fall to zero

c) the circuit current will reduce slightly

d) the current will flow through R1, but not through R2 or R3

/ 1

61. Two resistors connected in **series** have the following values... $R_1 = 20\ \Omega$ $R_2 = 40\ \Omega$

If 120 volts is applied to the circuit, the voltage across R_2 would be:

a) 40 volts

b) 60 volts

c) 80 volts

d) 120 volts

/ 1

Student Declaration and Feedback

This assessment is my own work and has not been copied from any source except from any reference material listed in the Assessment Instructions.

Student Signature:		**Date:**	
Student Feedback:	Would you like to make any comments about this assessment?		

Equation Reference Sheet

$$v = \frac{s}{t}$$

$$I = \frac{V}{R}$$

$$P = VI$$

$$P = I^2R$$

$$P = \frac{V^2}{R}$$

$$W = Pt$$

$$\eta\,\% = \frac{P_{out}}{P_{in}} \times \frac{100}{1}$$

$$P_{loss} = P_{in} - P_{out}$$

$$\frac{R_1}{R_2} = \frac{l_1}{l_2}$$

$$\frac{R_1}{R_2} = \frac{A_2}{A_1}$$

$$R = \frac{\rho l}{A}$$

$$I_T = I_1 = I_2 = I_3$$

$$V_T = V_1 + V_2 + V_3$$

$$R_T = R_1 + R_2 + R_3$$

$$P_T = P_1 + P_2 + P_3$$

$$V_2 = \frac{R_2}{R_T} \times V_T$$

$$V_T = V_1 = V_2 = V_3$$

$$I_T = I_1 + I_2 + I_3$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$R_T = \frac{R_1 \times R_2}{R_1 + R_2}$$

$$R_T = \frac{R}{n}$$

$$P_T = P_1 + P_2 + P_3$$

$$I_1 = \frac{R_T}{R_1} \times I_T$$

$$Q = It$$

$$Q = CV$$

$$W = 0.5CV^2$$

$$\tau = RC$$

$$C_T = C_1 + C_2 + C_3$$

$$V_T = V_1 = V_2 = V_3$$

$$Q_T = Q_1 + Q_2 + Q_3$$

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$V_T = V_1 + V_2 + V_3$$

$$Q_T = Q_1 = Q_2 = Q_3$$

$$R_2 = R_1(1 + \propto (t_2 - t_1))$$

Color	Color	1st Band	2nd Band	3rd Band Multiplier	4th Band Tolerance
Black		0	0	x1Ω	
Brown		1	1	x10Ω	±1%
Red		2	2	x100Ω	±2%
Orange		3	3	x1kΩ	
Yellow		4	4	x10kΩ	
Green		5	5	x100kΩ	±0.5%
Blue		6	6	x1MΩ	±0.25%
Violet		7	7	x10MΩ	±0.10%
Grey		8	8	x100MΩ	±0.05%
White		9	9	x1GΩ	
Gold				x0.1Ω	±5%
Silver				x0.01Ω	±10%